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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors:	Kevin Austin O'Dea et al.
Serial No.:	10/761,257
Group Art Unit:	3683
Filed:	01/21/2004
Examiner:	Christopher P. Schwartz
For:	MODULATOR NOISE REDUCTION VIA MOTOR CONTROL

APPEAL BRIEF

MAIL STOP APPEAL BRIEF-PATENTS
Commissioner for Patents
P.O. BOX 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In response to the Notification of Non-Compliant Appeal Brief mailed on 1/26/2006, Applicant submits the following Appeal Brief, which includes all of the information and arguments from the Appeal Brief filed on November 14, 2005 along with the Evidence and Related Proceedings Appendices. Please enter the following Appeal Brief in the appeal filed on October 3, 2005, and acknowledge by Advisory Action dated October 20, 2005.

REAL PARTY IN INTEREST

The real party in interest is Delphi Technologies, Inc., as evidenced by the assignment recorded at reel 014976, frame 0765.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences to the present application.

STATUS OF CLAIMS

Claims 1 – 9 stand rejected. No claims have been allowed, stand objected to, or stand withdrawn. No claims were cancelled in prosecution. As required, a Claim Appendix is included with this Appeal Brief.

STATUS OF AMENDMENTS

All amendments have been entered.

SUMMARY OF CLAIMED SUBJECT MATTER

The invention provides a method for controlling a vehicle with a braking system (10) having a first fluid line (18) extending between a master cylinder (12) and a brake caliper (14b) and a bypass-isolation valve (20) disposed along the first fluid line (18) between the master cylinder (12) and the brake caliper (14b). (Original Claim 1; Page 3 of the Application; Paragraphs [0010] and [0011]; Figure 1). The bypass-isolation valve (20) is moveable from a closed position to an open position in response to a predetermined fluid pressure in the first fluid line (18). (Original Claim 1; Page 3 of the Application; Paragraph [0011]; Figure 1). A second fluid line (22) extends from a first position (24) along the first fluid line (18) between the pressure-bypass valve (20) and the master cylinder (12) to a second position (26) along the first fluid line (18) between the pressure-bypass valve (20) and the brake caliper (14b). (Original Claim 1; Page 3 of the Application; Paragraph [0012]; Figure 1). A fluid pump (28) is disposed along the second fluid line (22). (Original Claim 1; Page 3 of the Application; Paragraph [0012]; Figure 1).

The method includes the step of pumping fluid to the brake caliper (14b) with the pump (28) to execute a controlled brake event wherein fluid pressure at the brake caliper is increased to a desired pressure. (Original and Amended Claim 1; Pages 3 and 5 of the Application; Paragraphs [0012] and [0017]; Figures 1 and 2). The method also includes the step of discontinuing the pumping during the controlled brake event prior to the fluid pressure in the first fluid line reaching the predetermined pressure and

prior to the bypass-isolation valve opening and prior to completion of the controlled brake event. (Original and Amended Claim 1; Pages 5 – 6 of the Application; Paragraphs [0018] – [0020]; Figures 1 and 2).

As set forth in claim 2, in one embodiment of the invention, the method also includes the step of disposing a prime valve (30) along the second fluid line (22) between the fluid pump (28) and the first position (24). (Original Claim 2; Page 4 of the Application; Paragraph [0013]; Figure 1). The exemplary embodiment of the method also includes the step of biasing the prime valve (30) to a closed position. (Original Claim 2; Page 4 of the Application; Paragraph [0013]; Figure 1).

As set forth in claim 3, the exemplary embodiment of the method also includes the step of closing the bypass-isolation valve (20) prior to the pumping step. (Original Claim 3; Page 5 of the Application; Paragraph [0017]; Figures 1 and 2). The exemplary embodiment of the method also includes the step of opening the prime valve (30) prior to the pumping step. (Original Claim 3; Page 5 of the Application; Paragraph [0017]; Figures 1 and 2).

As set forth in claim 4, the exemplary embodiment of the method also includes the step of sensing a first fluid pressure sensor (44) along the first fluid line (18). (Original Claim 4; Page 5 of the Application; Paragraph [0016]; Figure 1). The exemplary embodiment of the method also includes the step of controlling the pump (28) in response to the sensing step.
(Original Claim 4; Page 6 of the Application; Paragraph [0019]; Figures 1 and 2).

As set forth in claim 5, the exemplary embodiment of the method also includes the step of extending a third fluid line (34) from a third position (36) disposed along the first fluid line (18) between the second position (26) and the brake caliper (14b) to a first position (38) along the second fluid line (22) between the pump (28) and the prime valve (30). (Original Claim 5, Page 4 of the Application; Paragraph [0015]; Figure 1). The exemplary embodiment of the method also includes the step of disposing a bypass-apply valve (32) along the first fluid line (18) between the brake caliper (14b) and the sensor (44). (Original Claim 5, Pages 4 and 5 of the Application; Paragraphs [0014] and [0016]; Figure 1). The exemplary embodiment of the method also includes the step of disposing a release valve (40) along the third fluid line (34) between the first

position (38) and the third position (36). (Original Claim 5, Pages 4 and 5 of the Application; Paragraph [0015]; Figure 1). The exemplary embodiment of the method also includes the step of disposing a fluid accumulator (42) along the third fluid line (34) between the first position (38) and the release valve (40). (Original Claim 5, Pages 4 and 5 of the Application; Paragraph [0015]; Figure 1).

As set forth in claim 6, in a second embodiment of the invention, the method also includes the step of second pumping fluid to the brake caliper with the pump after said discontinuing step and prior to completion of the controlled brake event. (Page 6 of the Application; Paragraphs [0019] – [0020]; Figure 2). The exemplary embodiment of the method also includes the step of second discontinuing the pumping during the controlled brake event prior to the fluid pressure in the first fluid line reaching the desired pressure and the predetermined pressure and prior to the bypass-isolation valve opening. (Pages 3 – 4 and 6 of the Application; Paragraphs [0012] and [0019] – [0020]; Figure 2).

As set forth in claim 7, in a third embodiment of the invention, the pumping step is further defined as pulsing the pump during the controlled brake event to provide fluid to the brake caliper as needed without forcing the isolation valve open. (Pages 6 and 7 of the Application; Paragraphs [0021] and [0023]; Figure 2).

As set forth in claim 8, in a fourth embodiment of the invention, the pumping step includes the step of supplying electrical power to a motor of the pump for a predetermined period of time. (Page 5 and 6 of the Application; Paragraphs [0017] and [0022]; Figure 2).

As set forth in claim 9, the fourth embodiment of the supplying step includes the step of selecting the predetermined period of time to be a minimum amount of time required to insure that the motor spins and that the pump begins the movement of fluid. (Page 5 of the Application; Paragraph [0017]; Figure 2).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1 – 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pueschel et al., U.S. Pat. No. 6,361,126, in view of Itoh et al., U.S.

Pat. No. 6,349,995, and Kollers et al., U.S. Pat. No. 5,131,730 or Busch et al. U.S. Pat. No. 6,174,033.

ARGUMENT

1. CLAIMS 1 – 5 ARE PATENTABLE OVER THE PRIOR ART OF RECORD.

Claim 1 recites pumping fluid to the brake caliper with a pump to execute a controlled brake event. The fluid pressure at the brake caliper is increased to a desired pressure. Pumping is discontinued ***during*** the controlled brake event, prior to the fluid pressure in the first fluid line reaching the predetermined pressure and prior to the bypass-isolation valve opening. Claim 1 further emphasizes that the steps occur during the controlled brake event, reciting that pumping is discontinued ***prior to*** completion of the controlled brake event.

Neither Pueschel et al., nor Itoh et al., nor Kollers et al., nor Busch et al. teaches or suggests discontinuing pumping with a pump during a controlled brake event to prevent a pressure bypass valve from opening as recited in the claims. The Examiner has acknowledged that Pueschel et al. lacks mentioning when the pump is shut off. Itoh et al. does not teach or suggest discontinuing pumping with a pump during a controlled brake event to prevent a pressure bypass valve from opening. The portion of Itoh et al. cited by the Examiner states:

> It is also assumed that when the brake-assist control is to be performed, an increasing gradient of the wheel cylinder pressure is controlled by turning on a pump motor, or controlling on/off of the motor, with an inlet valve placed in its open position, and ***with a changeover valve placed in its closed position***. As a result, it may be possible to reduce a noise ***caused when driving the pump motor***, comparing with that caused when driving the pump motor continuously.

Itoh et al., column 1, lines 45-52 (emphasis added). The quoted text sets forth the positions of the valves but does not teach or suggest linking the control of the motor with operation of the valves as is recited in claim 1 of the present application. The noise contemplated and "controlled" by Itoh et al. is the noise generated by the pump, not the noise generated when the pressure bypass valve switches from closed to open.

Furthermore, it is submitted that Itoh et al. does not teach turning the pump motor completely off. Specifically, the quoted text is further explained starting at column 7, line 35, where Itoh et al. discloses that the speed of the pump is reduced during operation by changing the duty cycle of the motor. In other words, a variable amount of voltage is applied to motor, but the motor is always running. Starting at column 8, line 38, Itoh et al. expressly teaches that the pump is never turned off during the brake assist, the duty cycle reaching a minimum of 10%.

Kollers et al. does not teach or suggest discontinuing pumping with a pump during a controlled brake event to prevent a pressure bypass valve from opening. The Examiner has acknowledged that Kollers et al. discloses that the pump is shut off at the end of traction control when pressure builds are no longer needed. Claim 1 recites discontinuing the pumping during the controlled brake event prior to the fluid pressure in the first fluid line reaching the predetermined pressure and prior to the bypass-isolation valve opening and prior to completion of the controlled brake event.

Applicants traverse the Examiner's assertion that Kollers et al. states that noise reduction can be reduced through control of the valves and operation of the pump in column 5. At column 5, lines 12 – 16, Kollers et al. teaches operating a pump in "partial filling range" to enjoy a noise abatement compared to operating a pump at "full filling range." Nothing in Kollers et al. links the control of the motor with operation of the valves as is recited in claim 1 of the present application.

Busch et al. does not teach or suggest discontinuing pumping with a pump during a controlled brake event to prevent a pressure bypass valve from opening. Figure 3 of Bush et al. shows a process involving two pressure by-pass valves, USVBK1 and USVBK2. The valve USVBK1 is also referred to as valve 205 by Bush et al. at column 6, line 48. The valve USVBK1 205 is disclosed as being a pressure limiting valve at column 4, starting at line 24. The valve USVBK2 is also referred to as 205a at column 6, line 48. At step 313 in Figure 4, a query is completed as to whether the valve USVBK1 205 is open. The valve USVBK1 205 opens when the pressure in the brake system is above an upper threshold PSO. Column 6, lines 43 – 54. At least one of the valves USVBK1 205 and USVBK2 205a must be open for the process to proceed to step 315 wherein the pump is turned off. The pump is switched off after at least one of the

selector valves USVBK1 205 or USVBK2 205a is open or "not completely closed[.]" Id. at 53. Figure 4 illustrates and second embodiment with only a single by-pass valve, USVBK1 205. As with the first embodiment, the valve USVBK1 205 must be open for the process to proceed to step 315a wherein the pump is turned off. The claims of the present application recite that the pump is discontinued ***before*** the by-pass is urged to the open position by excess pressure.

Applicants further traverse the Examiner's assertion that Busch et al. discloses noise control may be affected using different pump delivery rates adapted to the opening/closing characteristics of particular valves at column 2, lines 24 – 32. The text mentions delivering pressurized fluid against a closed valve and delivering pressurized fluid to an open valve in a manner not compatible with the delivery rate. This statement is silent about the "opening/closing characteristics of particular valves." As set forth above, the pump is switched off after at least one of the selector valves 205 or 205a is open or not completely closed.

The Examiner has found references that teach reducing the operating rate of a brake pump to reduce noise generated by the pump. However, claim 1 of the application does not recite reducing the operating rate of a brake pump to reduce noise generated by the pump. Rather, claim 1 recites a novel and non-obvious control method for reducing noise generated by a pressure bypass valve during a controlled brake event. Specifically, claim 1 recites discontinuing pumping with a pump during a controlled brake event to prevent a pressure bypass valve from opening. As a result, the rejection fails to meet the requirements for a prima facie case of obviousness since all the claim limitations are not taught or suggested by the prior art. M.P.E.P. § 2143.03.

It is further submitted that the method recited in claim 1 is counterintuitive. For example, during a controlled brake event, a relatively large amount of fluid is needed at the brake caliper in a short amount of time but claim 1 recites turning the pump off during this time. Also, claim 1 recites a pressure bypass valve positioned in a brake system but also recites a control method that reduces the likelihood that the pressure bypass valve will ever be engaged. The invention provides a sophisticated trade-off between fluid needs and noise prevention.

2. CLAIM 6 IS PATENTABLE OVER THE PRIOR ART OF RECORD.

The arguments set forth in support of claim 1 are equally applicable to claim 6. Claim 6 recites additional steps that also define over the art. Specifically, claims 1 and 6 cooperate to recite an iterative process for building up fluid pressure while concurrently avoiding switching a pressure bypass valve to an open position. As set forth above, the prior art of record does not teach or suggest discontinuing pumping during a controlled brake event to prevent a pressure bypass valve from opening as recited in claim 1, much less restarting pumping after the discontinuing step and discontinuing the pumping again.

3. CLAIM 7 IS PATENTABLE OVER THE PRIOR ART OF RECORD.

The arguments set forth in support of claim 1 are equally applicable to claim 7. Claim 7 recites additional features that define over the art. Claim 7 recites that the pump is pulsed. As set forth above, the prior art of record does not teach or suggest discontinuing pumping during a controlled brake event and therefore does not teach or suggest pulsing a pump. The prior art of record teaches changing an operating rate of a pump, but maintaining power to the pump throughout the controlled brake event.

4. CLAIMS 8 AND 9 ARE PATENTABLE OVER THE PRIOR ART OF RECORD.

The arguments set forth in support of claim 1 are equally applicable to claims 8 and 9. Claims 8 and 9 recite additional features that define over the art. Claim 8 recites the pumping step includes the step of supplying electrical power to a motor of the pump for a predetermined period of time and claim 9 recites the supplying step includes the step of selecting the predetermined period of time to be a minimum amount of time required to insure that the motor spins and that the pump begins the movement of fluid.

CONCLUSION

For the reasons stated above, it is respectfully submitted that Appellants' invention as set forth in claims 1 – 9 patentably define over the cited references and are not suggested or rendered obvious thereby. As such, it is respectfully submitted that the Examiner's final rejection of claims 1 – 9 is erroneously based and its reversal is respectfully requested.

No oral hearing is requested. Appellants' attorney's check in the amount of $500 was submitted with the Appeal Brief filed on November 14, 2005. If additional fees are incurred because of this Appeal Brief and not included, the Commissioner is authorized to charge said additional fees, as well as credit any overpayments, to Deposit Account No. 08-2789 of Howard & Howard Attorneys, P.C.

Respectfully submitted,

HOWARD & HOWARD ATTORNEYS, P.C.

February 16, 2006

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Enc.: Attachment on 3 pages

CERTIFICATE OF MAILING BY "EXPRESS MAIL"

I hereby certify that the enclosed **Appeal Brief with appendices** and **return post card** are being deposited with the United States Postal Service as Express Mail, postage prepaid, in an envelope as "Express Mail Post Office to Addressee", **Mailing Label No. EV 848 163 415 US** and addressed to **MAIL STOP APPEAL BRIEF-PATENTS, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450**, on **February 16, 2006**.

Brenda J. Hughes

CLAIM APPENDIX FOR APPEAL BRIEF

1. (Previously Presented) A method for controlling a vehicle with a braking system having a first fluid line extending between a master cylinder and a brake caliper and a bypass-isolation valve disposed along the first fluid line between the master cylinder and the brake caliper wherein the bypass-isolation valve being moveable from a closed position to an open position in response to a predetermined fluid pressure in the first fluid line, a second fluid line extending from a first position along the first fluid line between the pressure-bypass valve and the master cylinder to a second position along the first fluid line between the pressure-bypass valve and the brake caliper, a fluid pump disposed along the second fluid line, the method comprising the steps of:

pumping fluid to the brake caliper with the pump to execute a controlled brake event wherein fluid pressure at the brake caliper is increased to a desired pressure; and

discontinuing the pumping during the controlled brake event prior to the fluid pressure in the first fluid line reaching the predetermined pressure and prior to the bypass-isolation valve opening and prior to completion of the controlled brake event.

2. (Original) The method of claim 1 including the steps of:

disposing a prime valve along the second fluid line between the fluid pump and the first position; and

biasing the prime valve to a closed position.

3. (Original) The method of claim 2 including the steps of:

closing the bypass-isolation valve prior to the pumping step; and

opening the prime valve prior to the pumping step.

4. (Original) The method of claim 3 including the steps of:

sensing a first fluid pressure sensor along the first fluid line; and

controlling the pump in response to the sensing step.

5. (Original) The method of claim 4 including the steps of:

extending a third fluid line from a third position disposed along the first fluid line between the second position and the brake caliper to a first position along the second fluid line between the pump and the prime valve;

disposing a bypass-apply valve along the first fluid line between the brake caliper and the sensor;

disposing a release valve along the third fluid line between the first position and the third position; and

disposing a fluid accumulator along the third fluid line between the first position and the release valve.

6. (Previously Presented) The method of claim 1 further comprising the steps of:

pumping fluid to the brake caliper with the pump after said discontinuing step and prior to completion of the controlled brake event; and

discontinuing the pumping after said second pumping step and during the controlled brake event prior to the fluid pressure in the first fluid line reaching the desired pressure and the predetermined pressure and prior to the bypass-isolation valve opening.

7. (Previously Presented) The method of claim 1 wherein said pumping step is further defined as:

pulsing the pump during the controlled brake event to provide fluid to the brake caliper as needed without forcing the isolation valve open.

8. (Previously Presented) The method of claim 1 wherein said pumping step further comprises the step of:

supplying electrical power to a motor of the pump for a predetermined period of time.

9. (Previously Presented) The method of claim 8 wherein said supplying step further comprises the step of:

selecting the predetermined period of time to be a minimum amount of time required to insure that the motor spins and that the pump begins the movement of fluid.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None